Viridian VR1816 Instruction Sheet

102-499

Infinitely Variable Speed, ECM High-Efficiency Circulator

SUPERSEDES: August 1, 2014 EFFECTIVE: September 30, 2014

Plant ID No. 001-4230

DESCRIPTION:

The Viridian VR1816 circulator is an infinitely variable speed wet rotor circulator with an ECM, permanent magnet motor. Operating modes include infinitely adjustable fixed speed or self-adjusting proportional or constant pressure variable speed. Its high efficiency motor reduces power consumption by up to 85% compared to equivalent AC permanent split capacitor circulators.

APPLICATION:

- Maximum operating pressure: 125 psi (8.6 bar)
- Maximum water temperature: 230°F (110°C)
- Electrical specifications:
  Voltage: 110-120V, 50/60 Hz, single phase
  Maximum operating power: 44W
  Maximum amp rating: 0.54
- Equipped with a cast iron casing and should be used for closed loop systems only.
- Taco circulator pumps are for indoor use only – employer uniquement a l'interieur.
- Acceptable for use with water or maximum of 50% water/glycol solution.

FEATURES:

- 3 operating modes:
  - Fixed speed ( ) - infinitely adjustable min/max settings
  - Constant pressure ( ), variable speed - 3 constant pressure differential curves (5, 10, or 15 feet of head)
  - Proportional pressure ( ), variable speed - 3 variable pressure differential curves (High, Med, or Low)
- Multi-color LED display showing operating mode and error code diagnostics.
- Use with a Taco ZVC Zone Valve Control or SR Switching Relay for ON/OFF operation.
- Integral Flow Check (IFC) is included in carton. Simply press into discharge flange if required.
- Nut capture feature on flanges for easier fit up.
- Whisper quiet operation.

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INSTALLATION:

WARNING: Do not use in swimming pool or spa areas. Pump has not been investigated for these applications.
AVERTISSEMENT: Ne pas utiliser dans une piscine ou un spa. La pompe n'a pas été étudiée pour ces applications.

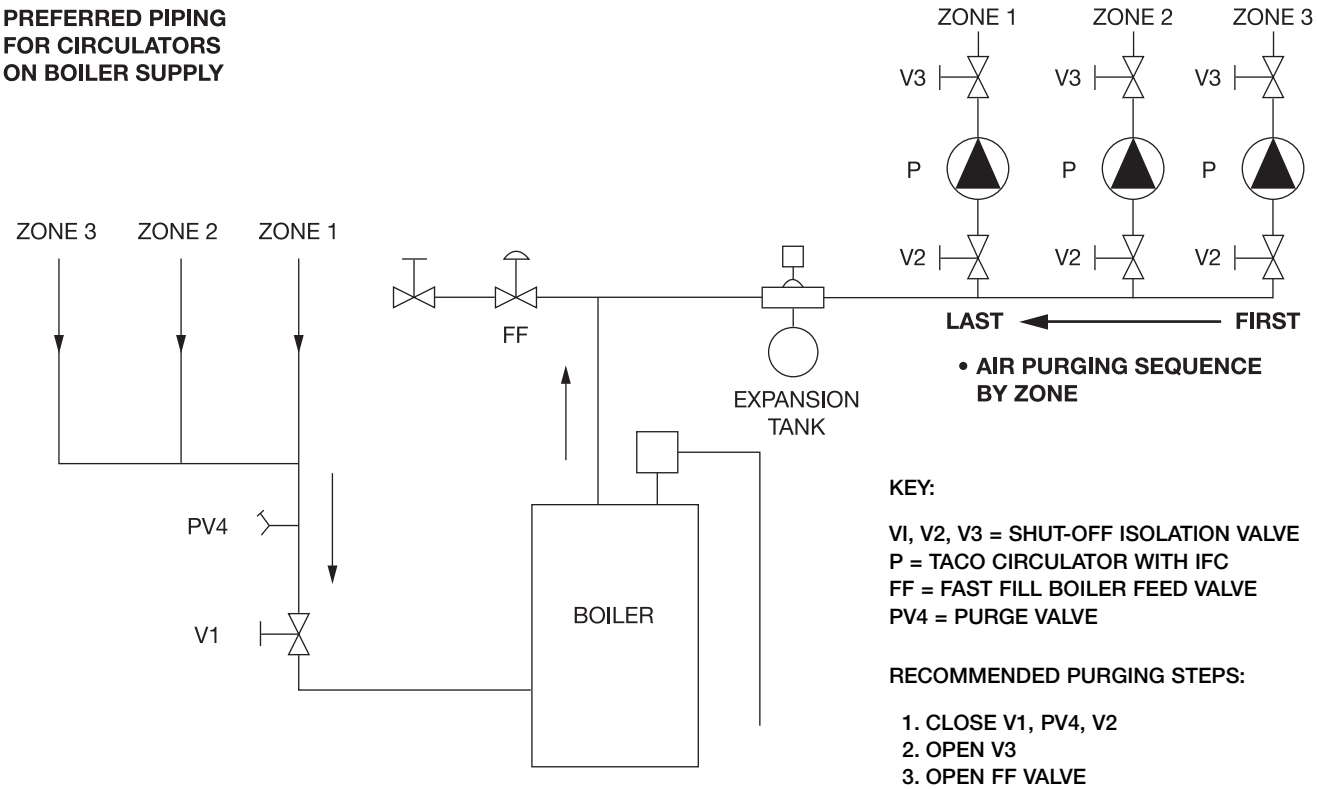
CAUTION: The addition of petroleum based fluids or certain chemical additives to systems using TACO equipment voids the warranty. Consult factory for fluid compatibility.
ATTENTION: L'ajout de liquides à base de pétrole ou de certains additifs chimiques à des systèmes utilisant un équipement TACO annule la garantie. Consultez le fabricant pour connaître la compatibilité de liquides.

CAUTION: Installations at elevations over 5000 feet must have higher fill pressure of 20 psi minimum to prevent pump cavitation and flashing. Premature failure may result. Adjust expansion tank pressure to equal fill pressure. A larger size expansion tank may be required.
ATTENTION: Des installations à des altitudes de plus de 1600 mètres doivent présenter une pression de remplissage plus élevée de 20 psi au minimum afin d'éviter toute cavitation ou flashing de la pompe. Une défaillance prématurée peut en résulter. Réglez la pression du réservoir d'expansion de façon qu'elle soit égale à la pression de remplissage. Un réservoir d'expansion d'une taille supérieure peut être nécessaire.

FIGURE 1:

MULTI-SPEED MODE

PREFERRED PIPING FOR CIRCULATORS ON BOILER SUPPLY



KEY:

VI, V2, V3 = SHUT-OFF ISOLATION VALVE
P = TACO CIRCULATOR WITH IFC
FF = FAST FILL BOILER FEED VALVE
PV4 = PURGE VALVE

RECOMMENDED PURGING STEPS:

1. **CLOSE V1, PV4, V2**
2. **OPEN V3**
3. **OPEN FF VALVE**
4. **OPEN V2, PV4, TO PURGE LAST ZONE FIRST (ZONE 3)**
5. **CLOSE FF VALVE**
6. **CLOSE V2, PV4**
7. **REPEAT STEPS 1 TO 6 FOR EACH ADDITIONAL ZONE, PURGE ZONE 1 LAST**
8. **OPEN V1 WHEN ALL ZONES ARE PURGED**
9. **ADJUST SYSTEM TO DESIRED OPERATING FILL PRESSURE IF REQUIRED**

ALTERNATE PIPING FOR CIRCULATORS ON BOILER RETURN

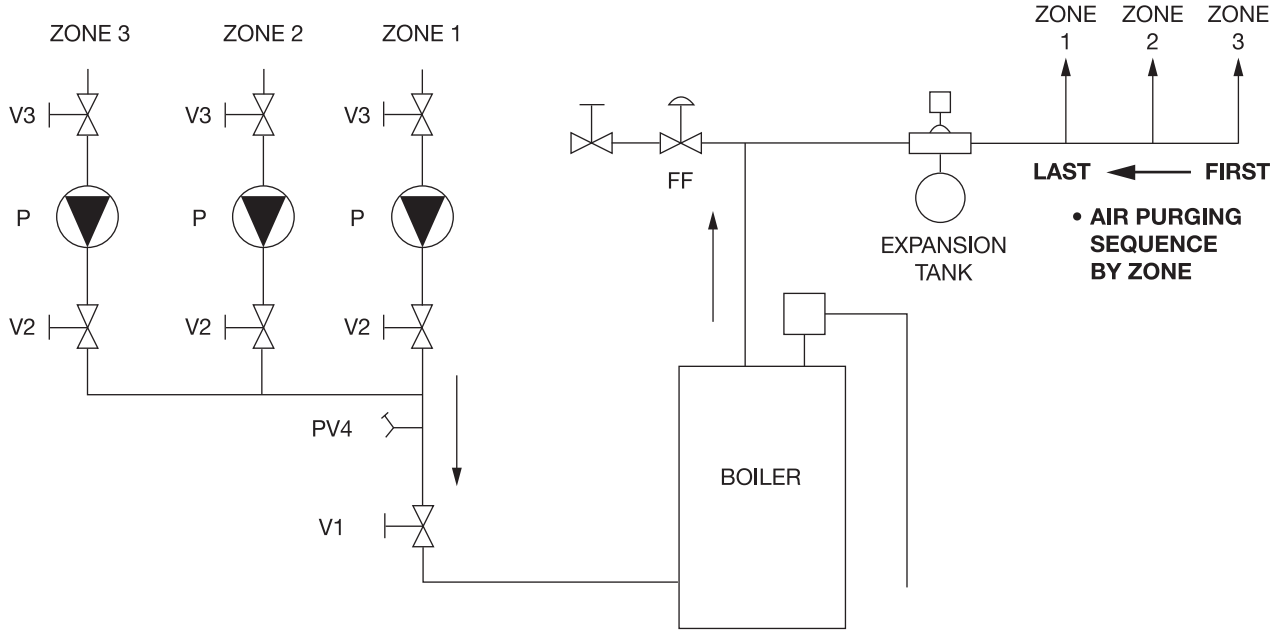
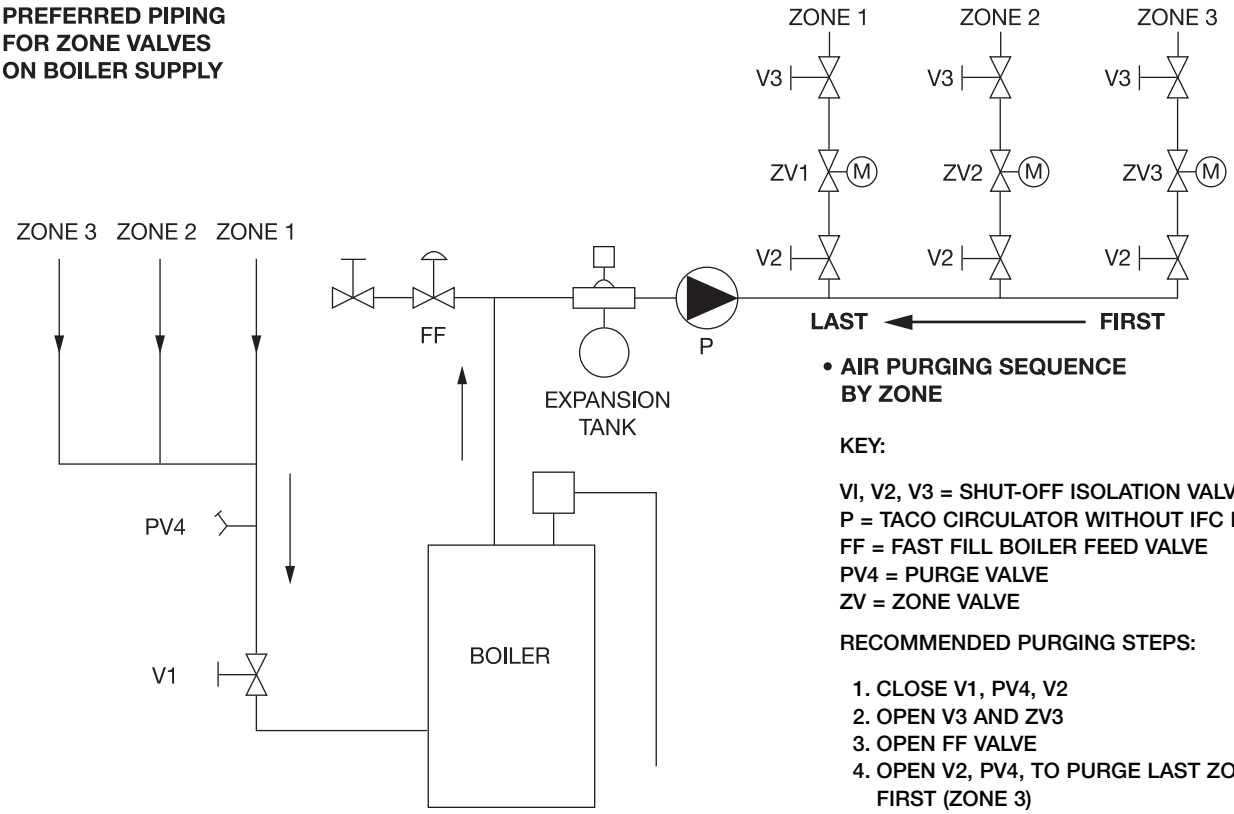


FIGURE 2:

MULTI-SPEED OR VARIABLE SPEED MODES

PREFERRED PIPING FOR ZONE VALVES ON BOILER SUPPLY



• AIR PURGING SEQUENCE BY ZONE

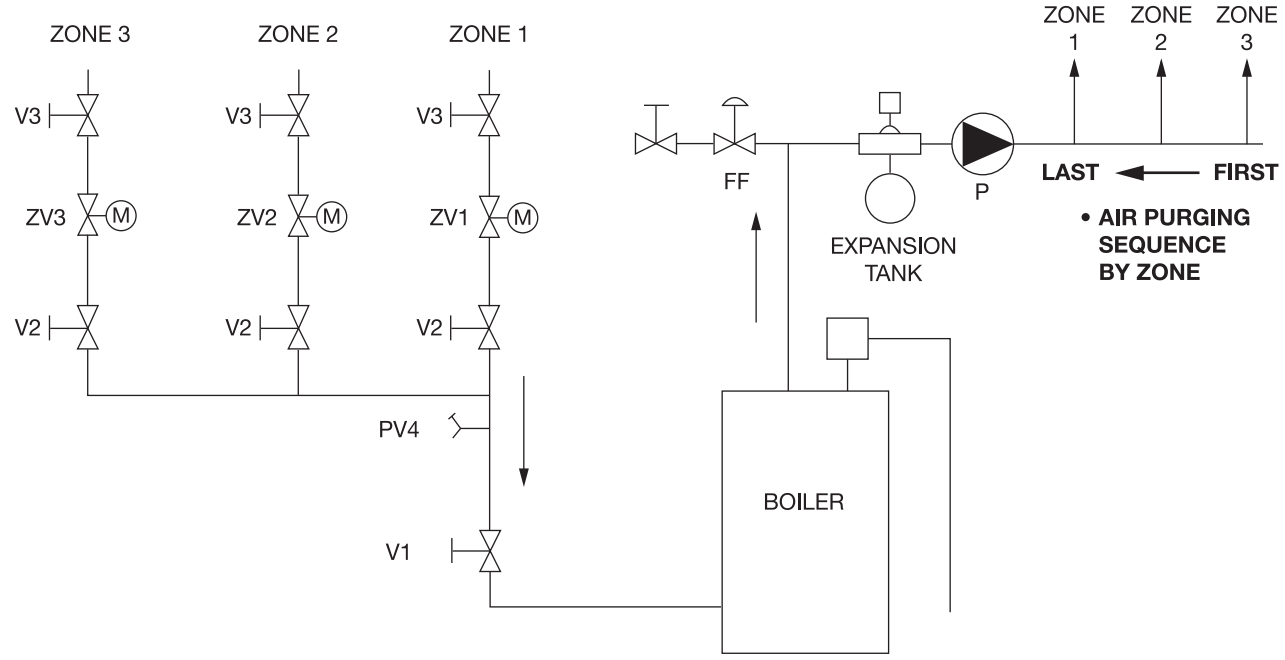
KEY:

VI, V2, V3 = SHUT-OFF ISOLATION VALVE
P = TACO CIRCULATOR WITHOUT IFC INSTALLED
FF = FAST FILL BOILER FEED VALVE
PV4 = PURGE VALVE
ZV = ZONE VALVE

RECOMMENDED PURGING STEPS:

1. **CLOSE V1, PV4, V2**
2. **OPEN V3 AND ZV3**
3. **OPEN FF VALVE**
4. **OPEN V2, PV4, TO PURGE LAST ZONE FIRST (ZONE 3)**
5. **CLOSE FF VALVE**
6. **CLOSE V2, PV4**
7. **REPEAT STEPS 1 TO 6 FOR EACH ADDITIONAL ZONE, PURGE ZONE 1 LAST**
8. **OPEN V1 WHEN ALL ZONES ARE PURGED**
9. **ADJUST SYSTEM TO DESIRED OPERATING FILL PRESSURE IF REQUIRED**
10. **MOVE ALL ZV TO CLOSED/AUTOMATIC POSITION**

ALTERNATE PIPING FOR ZONE VALVES ON BOILER RETURN

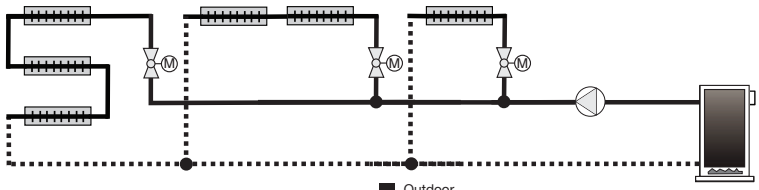


• AIR PURGING SEQUENCE BY ZONE

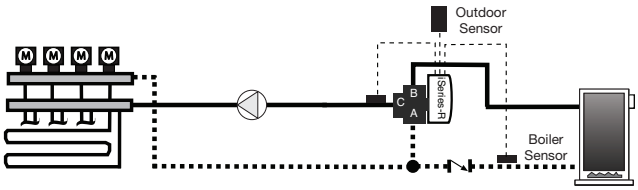
Typical Variable Speed Applications:

- Zone Valves
- Panel Radiation with Thermostatic Valves
- Radiant Loops with Actuators
  - Varies speed to maintain proportional or constant pressure differential (ΔP)

Across a Series Loop System Using Zone Valves



Across Multi-Zone Radiant Manifolds with Loop Actuators



1. Location:

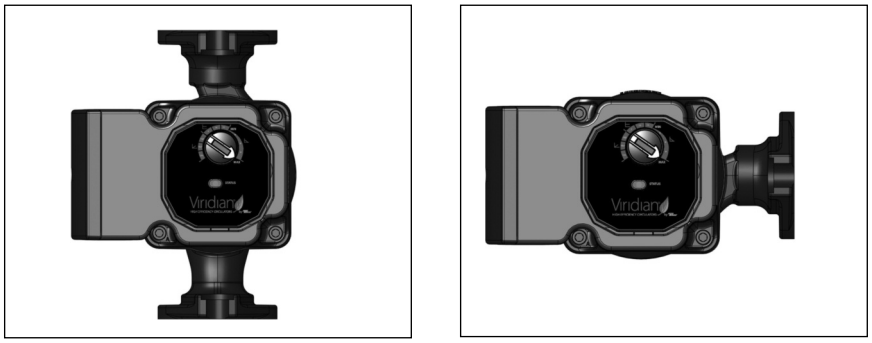
The circulator can be installed on the supply or return side of the boiler but for best system performance, it should always pump away from the expansion tank. See piping diagrams in Figures No.1 and No. 2.

CAUTION: Do not use flat rubber gaskets. Only use O-ring gaskets provided or leaks may result. Warranty will be void.

2. Mounting position:

Circulator must be mounted with the motor in the horizontal position. See diagrams below for acceptable motor mounting orientations.

ACCEPTABLE MOTOR MOUNTING POSITIONS



Position electrical junction box at 9 o'clock position for best programming and viewing orientation. Casing may be rotated to change flow direction. Locate the arrow on the casing body to determine flow direction.

CASING ROTATION

To rotate the casing, remove the 4 motor screws and spin the casing to the desired flow direction. Reattach the 4 screws ($^{5}/_{32}$"allens wrench required). Be sure body gasket is seated evenly to prevent leakage. Tighten motor screws to 34-42 in-lbs torque.

CAUTION: To reduce the possibility of noise transmission, be sure to add vibration dampeners to piping when mounting circulator to wall or floor joists.

ATTENTION: Pour réduire la possibilité de transmission de bruit, veillez à ajouter des amortisseurs de vibration à la tuyauterie lors du montage du circulateur sur des chevêtres de mur ou de plancher.

3. Fill the system with tap water or a maximum of 50% propylene-glycol and water solution:

The system must be filled before operating the circulator. The bearings are water lubricated and should not be allowed to operate dry. Filling the system will result in immediate lubrication of the bearings. It is always good practice to flush a new system of foreign matter before starting the circulator.

WARNING: Risk of electric shock. To reduce the risk of electric shock, be certain that it is connected only to a properly grounded, grounding-type receptacle. Follow all local electrical and plumbing codes.

AVERTISSEMENT: Risque de choc électrique. Pour réduire le risque de choc électrique, veillez à ce qu'elle soit raccordée uniquement à un réceptacle de type mise à la terre proprement mis à la terre. Respectez tous les codes de plomberie et électriques locaux.

WARNING: Use supply wires suitable for 90°C. AVERTISSEMENT: Employer des fils d'alimentation adeqauts pour 90°C.

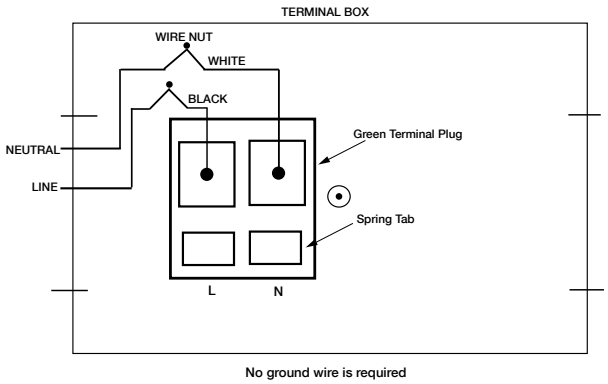
WARNING: Disconnect power when servicing.

CAUTION: Use flexible conduit only. Not for use with rigid conduit.

WARNING: SERVICING OF DOUBLE-INSULATED APPLIANCES. A double-insulated appliance is marked with one or more of the following: The words "DOUBLE INSULATION" or "DOUBLE INSULATED" or the double insulation symbol (square within a square). In a double-insulated appliance, two systems of insulation are provided instead of grounding. No grounding means is provided on a double-insulated appliance, nor should a means for grounding be added. Servicing a double-insulated appliance requires extreme care and knowledge of the system, and should be done by qualified service personnel. Replacement parts for a double-insulated appliance must be identical to the parts they replace.

4. Wiring the circulator: Disconnect AC power supply. Remove terminal box cover. Attach a wiring connector into knockout hole. Use flexible conduit only. Connect Line/Hot power to the black lead, Neutral to the white lead. See wiring diagram.

Note: If pigtail leads provided are not used, be sure to trim field wire to a strip length of .25" (+/- .025") to prevent exposed wire causing a short at the terminal plug. Connect line and neutral to green terminal plug as shown in diagram. Depress the spring tab with a small screwdriver to insert wire into plug. Release tabs to complete connection. The VR1816 is a double insulated circulator, no grounding wire is necessary. Replace terminal box cover.



No ground wire is required

5. Start the circulator:

It is recommended to run the circulator at full speed for a minimum of 5 minutes when purging the system to remove remaining air from the bearing chamber. This is especially important when installing the circulator in the off-season.

CAUTION: Never run the circulator dry or permanent damage may result.
ATTENTION: Ne laissez jamais le circulateur tourner à sec, des dommages permanents peuvent en résulter.

Full Speed Operation:

To run the pump at full speed during the fast fill, start-up and purge process, rotate dial to max speed setting. To return to the normal operating mode, turn dial to desired fixed speed, constant pressure, or proportional pressure setting.

6. Programming your VR1816 circulator:

Note: The VR1816 is factory-programmed for maximum speed operating mode. If this is your desired operating mode, no programming changes are required.

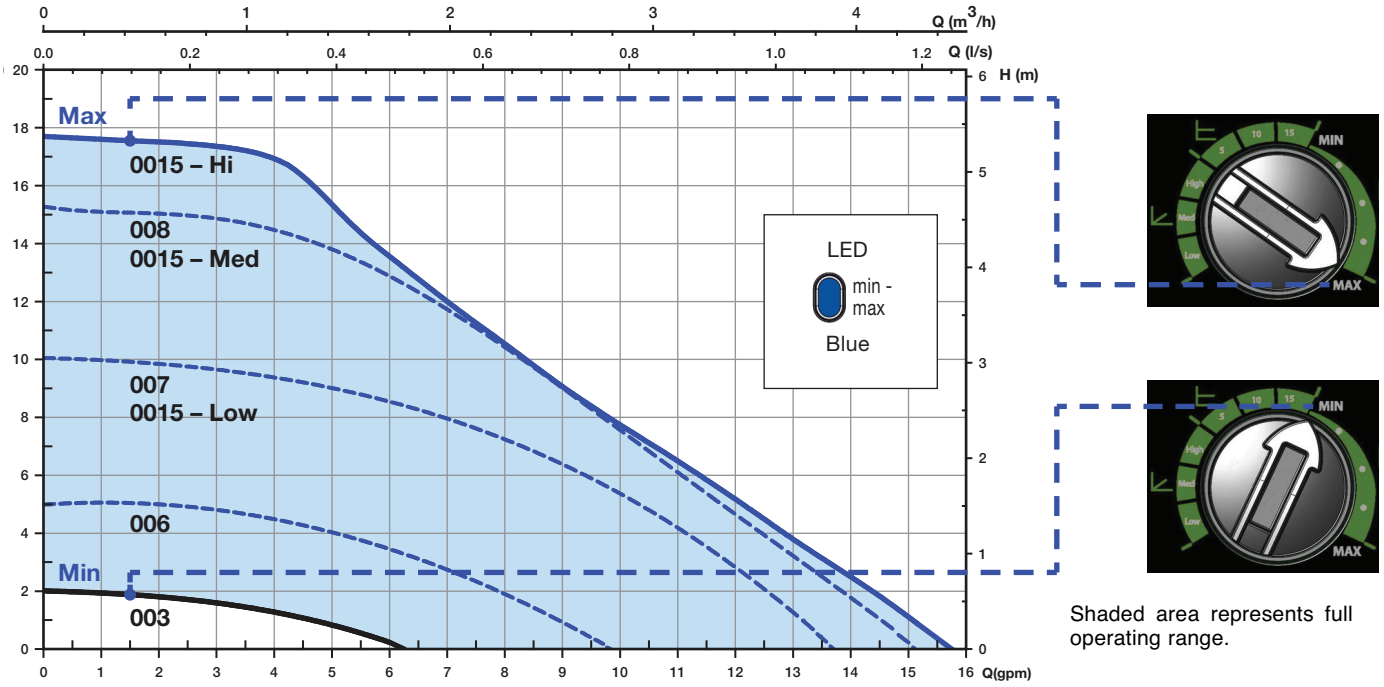
The VR1816 has 3 Operating Modes:

- **Fixed Speed ( ) - Infinitely adjustable settings (min-max).**
- **Constant Pressure ( ) - Varies speed to maintain a constant pressure differential.**
- **Proportional Pressure ( ) - Varies speed to maintain a proportional/variable pressure differential.**

To change operating mode and settings:

Modify the performance of the circulator (head) as needed by rotating the dial using a flat screwdriver. The LED will flash each time mode is changed. See diagrams below to determine best mode of operation for the system.The selection of the right functioning curve depends on the characteristics of the heating system in question and the actual heat demand.

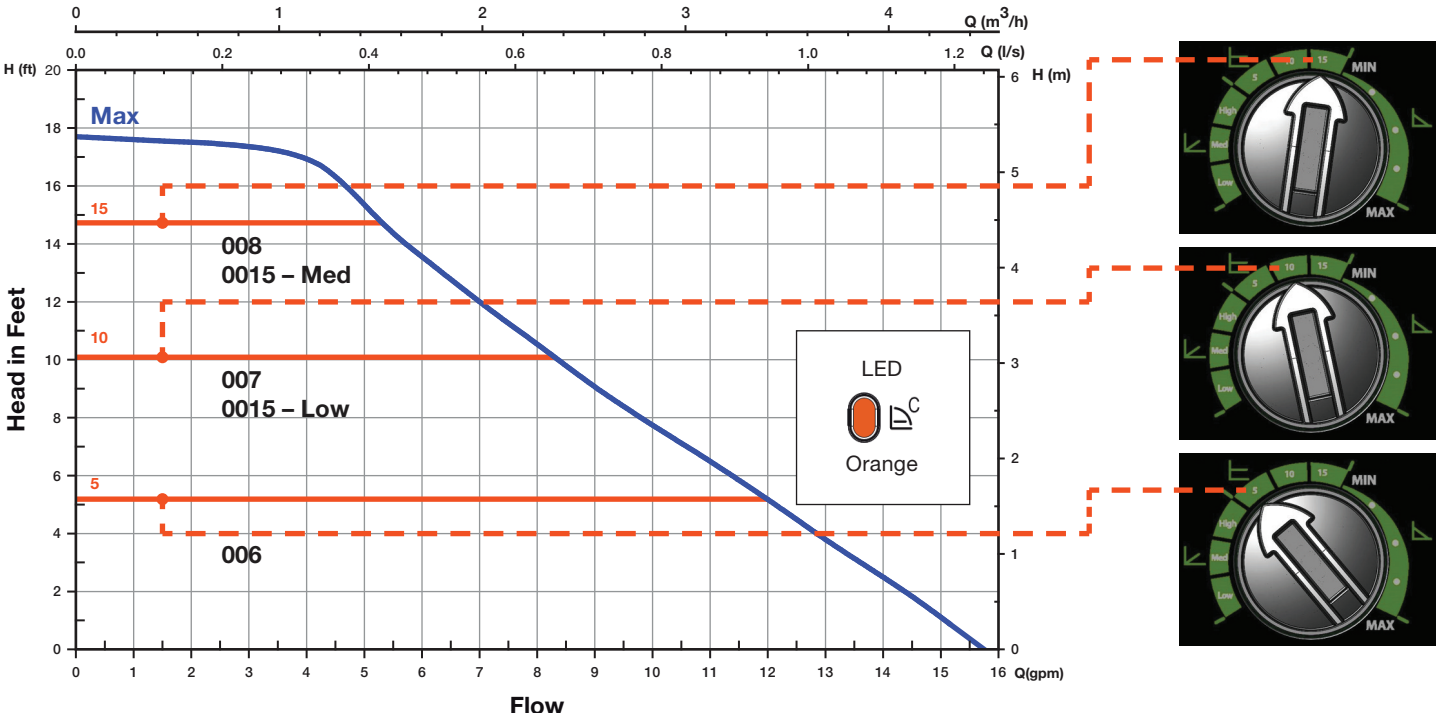
FIXED SPEED MODE ( ) – Infinitely Adjustable (Min-Max)



Shaded area represents full operating range.

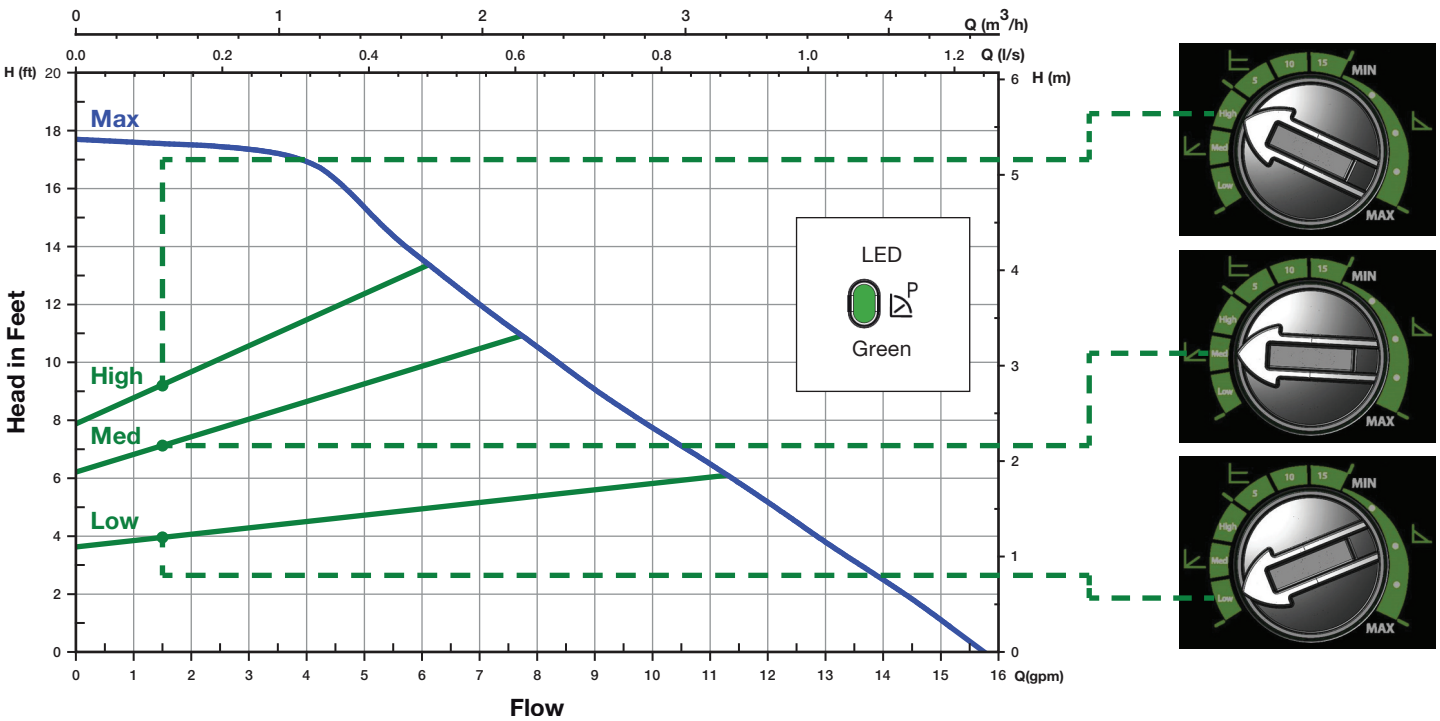
Fixed speed mode ( ) allows the installer to fine tune the circulator flow rate to precisely match design load conditions. It is infinitely variable between min/max settings. See chart above for equivalent 00 model at each variable speed setting.

CONSTANT PRESSURE MODE (⊢) – Variable Speed



In Constant pressure mode (⊢), the circulator maintains a constant pressure differential (Δp-c) in the system as heating load increases or decreases. Selection options are 5, 10, or 15 feet of head constant pressure. See chart above for equivalent 00 model at each setting.

PROPORTIONAL/VARIABLE PRESSURE MODE (◺) – Variable Speed



In Proportional/variable pressure mode (◺), the circulator maintains a proportional pressure differential (Δp-v) as heating load increases or decreases. Flow will change in relationship to the change in pressure differential. Selection options are Low, Medium, or High. If unsure on proper setting, select Medium and adjust as needed.

CAUTION: Do not attempt to remove LED panel from circulator. Serious damage to circulator electronics may result.
ATTENTION: N'essayez pas de retirer le panneau de LED du circulateur. Des dommages sérieux à l'électronique du circulateur peuvent en résulter.

7. Troubleshooting the error codes:

Listed below are potential diagnostic error codes which will appear on the LED display in case of a malfunction.

FAULTS	CONTROL PANEL	CAUSES	REMEDIES
The circulator is noisy	LED on	Suction pressure is insufficient - cavitation	Increase the system suction pressure within the permissible range
	LED on	Presence of foreign bodies in the impeller	Disassemble the motor and clean the impeller
Loud noises of water circulation	Flashing white LED	Air in the system	Vent the system. Repeat fill and purge steps
	LED on	The flow is too high	Reduce the pump speed
Circulator is not running although the electrical power supply is switched on	LED off	Lack of power supply	Verify incoming voltage from power supply Verify the connection to the motor
		Circuit breaker might be tripped	Check circuit breaker at panel and reset if necessary
		The circulator is defective	Replace the pump
		Overheating	Let the pump cool down. Then try to re-start it. Verify that the water and ambient temperature are within the indicated temperature ranges
	LED red	The rotor is blocked	Disassemble the motor and clean the impeller. See unlocking procedure below
		Insufficient supply voltage	Verify that the power supply matches the data on the name plate
Building does not get warm	LED on	The circulator performance is too low	Increase the suction head. Increase speed or ΔP setting

Unlocking Procedure:

A red light in the LED indicates the circulator is locked or sticking. Turn the selector to the position MAX, disconnect and connect power supply to start the automatic release process. The circulator makes 100 attempts to restart (process lasts approximately 15 minutes). Every restart is signalled by a short flash of white LED light. If the locking is not removed through the automatic release process after 100 attempts to restart the circulator, it goes into standby and the LED remains solid red. In this case follow the manual procedure described in the next steps: during any attempt, the red LED light keeps blinking; after that the circulator tries again to start. If the locking is not removed through the automatic release process (the warning light returns to be red), perform the manual steps described below.

1. Disconnect power supply - the warning light switches off.
2. Close both isolating valves and allow cooling. If there are no shut-off devices, drain the system so that the fluid level is beneath that of the circulator.
3. Loosen 4 motor bolts. Remove motor from casing. Carefully pull the rotor/impeller from the motor.
4. Remove impurities and deposits from the impeller and casing.
5. Reinsert the rotor/impeller into the motor.
6. Set the dial to the MAX position.
7. Connect power supply. Check for impeller rotation.
8. If the circulator still doesn't run it will need to be replaced.

VR1816 Pump Cross Reference (Fixed Speed Mode):

SPEED	TACO	GRUNDFOS	WILO	B & G/XYLEM	ARMSTRONG
Minimum	003 006	- Alpha 15-55 (1)	-	- Eco-Vario (Low)	Compass-1
Medium	007 008 0015-1 0015-2	UP-15-42 UPS-15-58-1 UPS-15-58-2 Alpha 15-55 (2)	Star S-21-1 Star S-21-2	NRF-25-1 NRF-25-2 Eco-Vario (Med)	Astro 230-1 Astro 230-2 Compass-2
Maximum	0015-3	UPS-15-58-3 Alpha 15-55 (3)	Star S-21-3	NRF-25-3 Eco-Vario (Hi)	Astro 230-3 Compass-3

VR1816 Pump Cross Reference (Variable Speed Mode):

TACO	GRUNDFOS	WILO	B & G/XYLEM	ARMSTRONG
VR1816	Alpha 15-55	Stratos Eco	Eco-Auto	Compass 20-20

LIMITED WARRANTY STATEMENT

Taco, Inc. will repair or replace without charge (at the company's option) any Taco High Efficiency circulator or circulator part which is proven defective under normal use within three (3) years from the date of manufacture.

In order to obtain service under this warranty, it is the responsibility of the purchaser to promptly notify the local Taco stocking distributor or Taco in writing and promptly deliver the subject product or part, delivery prepaid, to the stocking distributor. For assistance on warranty returns, the purchaser may either contact the local Taco stocking distributor or Taco. If the subject product or part contains no defect as covered in this warranty, the purchaser will be billed for parts and labor charges in effect at time of factory examination and repair.

Any Taco product or part not installed or operated in conformity with Taco instructions or which has been subject to misuse, misapplication, the addition of petroleum-based fluids or certain chemical additives to the systems, or other abuse, will not be covered by this warranty.

If in doubt as to whether a particular substance is suitable for use with a Taco product or part, or for any application restrictions, consult the applicable Taco instruction sheets or contact Taco at (401-942-8000).

Taco reserves the right to provide replacement products and parts which are substantially similar in design and functionally equivalent to the defective product or part. Taco reserves the right to make changes in details of design, construction, or arrangement of materials of its products without notification.

TACO OFFERS THIS WARRANTY IN LIEU OF ALL OTHER EXPRESS WARRANTIES. ANY WARRANTY IMPLIED BY LAW INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS IS IN EFFECT ONLY FOR THE DURATION OF THE EXPRESS WARRANTY SET FORTH IN THE FIRST PARAGRAPH ABOVE.

THE ABOVE WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR STATUTORY, OR ANY OTHER WARRANTY OBLIGATION ON THE PART OF TACO.

TACO WILL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF ITS PRODUCTS OR ANY INCIDENTAL COSTS OF REMOVING OR REPLACING DEFECTIVE PRODUCTS.

This warranty gives the purchaser specific rights, and the purchaser may have other rights which vary from state to state. Some states do not allow limitations on how long an implied warranty lasts or on the exclusion of incidental or consequential damages, so these limitations or exclusions may not apply to you.

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